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Propensity-score Matching as Tool to Assess the Income Effect of Jatropha Plantation Work in Rural Madagascar: A Case Study

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Abstract

This study assesses the potential impact of wage work generated by a local *Jatropha* plantation on household income in rural Madagascar. The cooperating *Jatropha* plantation is located in central Madagascar at the district of Ambalavao, province Fianarantsoa. Since the plantation was installed it demands hired labour for plantation expansion and maintenance independent of the local growing seasons. The calculation for the average income effect is based on data derived by a socio-economic household survey undertaken by the authors in 2009. To assess the average income effect we apply a propensity score matching analysis, as working for the plantation is not randomly assigned and we therefore have to deal with bias generated due to self-selection into participation. In a first step we predict the participation of households into working for the *Jatropha* plantation using a logit model with the binary outcome participation or non-participation. Via introducing 32 independent variables covering household characteristics of 336 randomly selected household from three villages in the vicinity of the *Jatropha* plantation we reach to correctly predict participation or non-participation of overall households at 73.8%. In a second step we compare the income per person for households which participate and for households which do not participate. This comparison uses the calculated propensity score as one-dimensional indicator for multidimensional household characteristics. Due to this we are able to match households which participate and households which do not participate with special regard on their household characteristics and therefore come to an unbiased estimate for the income effect. The results after applying Nearest Neighbour matching without replacement and caliper 0.13 show an average treatment effect for participating households of 93,008 Ariary per person (ca. € 33) and an average treatment effect across the whole sample of 37,950 Ariary per person (ca. € 14) during the last 12 months. The reduction of standardised bias reached 68.5% with regard to applied matching method.

Keywords: Impact assessment, *Jatropha*, propensity score matching